



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: 400 M STREET, N.E., 4TH FLOOR, ALEXANDRIA, VA 22304-4100  
P.O. Box 145  
Alexandria, Virginia 22304-4100  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/888,975	06/22/2003	Jeffrey Scott Obert	100074574	9544

75-00 05/20/2003  
HI-WLETT-PACKARD COMPANY  
Intellectual Property Administration  
P.O. Box 272400  
Fort Collins, CO 80527-2400

EXAMINER

AHMED, SHAMIM

ART UNIT	PAPER NUMBER
----------	--------------

1768

DATE MAILED: 05/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/888.975

Applicant(s)

OBERT ET AL.

Examiner

Shamim Ahmed

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 March 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) 19-23 and 27-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18, 24, 25 and 31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Election/Restrictions*

1. Claims 19-23 and 27-30 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 5.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1,11, 13 and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Lee et al (5,877,791).

As to claims 1,11 and 31, Lee et al disclose a method of making a slotted substrate in the manufacturing of an ejection device such as ink jet print head, wherein a masking layer (35) is formed over the front surface of a substrate (21) and the masking layer is patterned to form holes there through, wherein the hole exposes the substrate (col.7, lines 18-36 and figures 4G-4J).

Lee et al also disclose that depositing a first layer (36) over the mask layer and the hole and patterning and etching the first layer to form a plug (col.7, lines 34-38 and figure 4H).

Lee et al further disclose that etching a backside of the substrate until a bottom surface of the plug is substantially exposed and a slot (38) in the substrate is

Art Unit: 1765

substantially formed, wherein the plug substantially plugs up the slot (col.7, lines 42-45 and figures 4I-4J).

As to claim 13, Lee et al depositing a thin film stack including a fluid ejector over the first surface of the substrate and under the masking layer (col.6, lines 16-32 and see figure 4G).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1, 3-11, 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Then et al (5,569,355) in view of Bower (4,579,812).

As to claims 1 and 11, Then et al disclose a process for making slotted substrate, wherein a masking layer (10) is formed over a front surface of a substrate (20) (col. 3, lines 21-62 and figure 1, steps 1-3). As to claim 11, examiner does not give any patentable weight to the preamble " a method of manufacturing a fluid ejection device".

Then et al teach that the mask layer is patterned and etched to form holes there through (see figure 1, steps 3-4).

Then et al also teach that depositing a first layer over the substrate and the holes and then patterning and etching the first layer the holes to form plugs (col.4, lines 52-57).

Then et al do not explicitly teach that the first layer is deposited over the mask layer.

However, in a method of making slotted substrate, Bower teaches that a filling or plug-forming material is formed over the mask layer (11) and the hole (15') without removing the mask layer (col.5, lines 5-25, lines 50-53 and figure 1E).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Bower's teaching into Then et al's process for defining the dimension of a slot as taught by Bower.

By doing so, one of ordinary skilled in the art will reduce the process time by reducing the processing step.

Then et al further teach that etching the backside of the substrate until substantially exposed the plug to form slotted substrate (col.4, lines 58-61).

As to claims 2 and 12, Then et al teach that removing the fill or plug material in between the pillars (72) to form the slotted substrate (see step 7 of figure 1).

As to claim 3, Then et al teach that another masking layer is formed over the backside of the substrate (See figure 1, step 7).

As to claims 4 and 16, Then et al teach that the substrate is etched using KOH (col.5, lines 23-26).

As to claim 5, Then et al teach that the hole in the substrate corresponds the hole in the mask layer (Figure 1, step 4).

As to claim 6, Then et al teach that the first layer comprises silicon oxynitride, silicon oxide or silicon nitride (col.4, lines 13-15).

As to claim 7, Then et al teach that masking layer is etched at a different etch rate, which is slower than the etch rate of the filling material or the plug-forming material (col.4, lines 63-67).

As to claims 17-18, Then et al teach that the slot (60) has a first wall section adjacent to the first surface of the substrate and a second wall section adjacent to the second surface of the substrate, wherein the second wall section would shaped substantially truncated as pyramid due to the anisotropic action of the etching solution (col.5, lines 25-27 and Figure 1, step 7).

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Then et al (5,569,355) in view of Bower (4,579,812) as applied to claims 1,3-11 and 16-18 above, and further in view of Shimada et al (6,376,833).

Art Unit: 1765

Modified Then et al discussed above in the paragraph 10 but fail to teach an etching process after the backside etching of the substrate in order to remove the plug.

However, in a method of manufacturing micro-aperture or slot, Shimada et al teach that an etching is performed to remove the protection of plug-forming layer (5) after back-side etching process in order to produce the apertures or slots (7) (col.5, lines 45-64 and figure 2F).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Shimada et al's teaching into modified Then et al's process for efficiently forming an aperture or slot through a substrate as taught by Shimada et al.

7. Claims 12,14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (5,877,791) as applied to claims 1,11-13 above, and further in view of Shimada et al (6,376,833).

As to claim 12, Lee discussed above in the paragraph 3.

Lee et al remain silent about removing the plug by introducing an etching process after the back- side etching of the substrate.

However, in a method of manufacturing micro-aperture or slot, Shimada et al teach that an etching is performed to remove the protection of plug-forming layer (5) after back-side etching process in order to produce the apertures or slots (7) (col.5, lines 45-64 and figure 2F).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Shimada et al's teaching into Lee et al's process for efficiently forming an aperture or slot through a substrate as taught by Shimada et al.

As to claim 14, Lee et al teach that a thin-film stack including a fluid ejector is deposited over the first surface of the substrate (see figure 2).

As to claim 15, Lee et al teach that a firing chamber is formed over the thin-film structure, wherein a plurality of aperture is made through the first surface of the substrate (see figure 2).

8. Claims 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Then et al (5,569,355) in view of Bower (4,579,812) as applied to claims 1-12,16-18 above, and further in view of Lai (6,133,131).

Modified Then et al discussed above in the paragraph 10 but fail to teach etching the protective or plug-forming layer is etched using a buffered oxide etch (BOE) instead of using KOH.

However, in a method of etching dielectric layer, Lai teaches that potassium hydroxide (KOH) and a buffered oxide etcher (BOE) are functionally equivalent (col.3, lines 6-10).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Lai's teaching into modified Then et al's process because both the KOH and BOE are functionally equivalent in order to efficiently etch the protection or plug-forming layer, which comprises dielectric layer as taught by Lai.



As to claim 26, it would have been expected to have the same etch rate because all the process constituents and condition are similar as the claimed invention.

***Response to Arguments***

9. Applicant's arguments filed 3/12/03 have been fully considered but they are not persuasive.

Applicants argue that none of the applied references teach the present invention, wherein the invention requires that patterning and etching the masking layer to form a hole to expose the substrate and etching backside of the substrate to form a fluid slot, wherein the slot is substantially plugs up the slot.

This is not persuasive that the applied prior art Lee et al clearly disclose that patterning and etching the masking layer to form a hole to expose the substrate and also disclose that the hole is plugged and then the substrate is etched from the back side to form a slot, wherein the plug is substantially plugs up the slot (see the rejection above).

As to the Then et al, examiner states that Then et al also disclose a process, wherein the masking layer is patterned and etched to form holes in order to expose the substrate and the holes are filled with filling material and then the substrate is etched from the back side to form a slot, wherein the slot is substantially plugs up by the filler material (72) (see the rejections above).

***Conclusion***

**10. THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (703) 305-1929. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

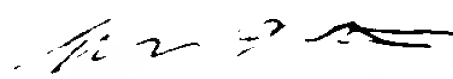
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703)-872-9310 for regular communications and (703) 872-9311 for After Final communications.

Art Unit: 1765

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Shamim Ahmed  
Examiner  
Art Unit 1765

SA  
May 18, 2003

  
BENJAMIN L. UTECH  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700